

Teacher: Mrs. RoenUnit: Annuities and MortgagesCourse: MAP 4CLesson: 6 – 4 Regular Payment of an Annuity◆ **Homework Check:** Lesson 6 - 3◆ **Note:** Regular Payment of an Annuity

Sometimes when working with annuities, we might want to know how much the regular payment is in order to accumulate the amount of an annuity or how much the regular payment will be from an annuity in the future. In order to find this, we have to rearrange the formulas we have been given for R.

Amount formula:

$$A = \frac{R[(1+i)^n - 1]}{i}$$

$$Ai = R[(1+i)^n - 1]$$

$$\frac{Ai}{(1+i)^n - 1} = R$$

Present Value formula:

$$PV = \frac{R[1 - (1+i)^{-n}]}{i}$$

$$PVi = R[1 - (1+i)^{-n}]$$

$$\frac{PVi}{1 - (1+i)^{-n}} = R$$

Now it is important to remember when to use these two formulas. The payment formula with the positive exponent will be used for future values and the payment formula with the negative exponent will be used to find what payment needs to happen today (like a loan situation) in order to accumulate the annuity amount necessary. For example,

- a) Sarah wants to save \$5000 for a trip to Italy in 4 years. What regular monthly deposits does she need to make into her savings account that pays 4% compounded monthly?

$$\frac{0.04}{12} = 0.0033333333$$

$$n = 4(12) = 48$$

$$R = \frac{Ai}{(1+i)^n - 1}$$

$$R = \frac{5000(0.0033333333)}{(1+0.0033333333)^{48} - 1}$$

$$R = \$96.23$$

Therefore, Sarah needs to make regular payments of \$96.23 into her savings account each month.

- b) David borrows \$2500 to buy a used car. He will repay the loan over 2 years in equal monthly payments at 12.5% interest compounded monthly. How much is David's payment?

$$\frac{0.125}{12} = 0.01041666667$$

$$n = 2(12) = 24$$

$$R = \frac{2500(0.01041666667)}{1 - (1 + 0.01041666667)^{-24}}$$

$$R = \$118.27$$

David will need to pay \$118.27 each month on his car loan.

◆ **Homework: Lesson 6 - 4**

Lesson 6 – 4:

1. Evaluate each of the following.

a) $\frac{7800 \times 0.03}{(1.03^{14} - 1)} =$

b) $\frac{35000 \times 0.025}{(1.025^{48} - 1)} =$

2. Complete the following table.

Amount	Present Value	Interest Rate	Frequency of Compounding	Length of Annuity
\$4500		8%	Semi-annually	6 years
\$25000		6%	Annually	12 years
	\$4000	8%	Quarterly	5 years
	\$3500	24%	Monthly	2 years

3. State whether each situation involves amount OR present value. Write an A or PV by each.

a) Steve plans to repay his student loan by making equal monthly payments

b) Winnie saves \$5000 by making weekly payments at the bank

c) Sarge plans to retire a millionaire by making equal deposits in an RESP

d) Vinnie plans to make equal semi-annual withdrawals from her retirement fund

4. Carolyn gets a small business loan for \$75 000. She will repay the loan with equal monthly payments over 5 years at 8.4% interest compounded monthly.

a) What is Carolyn's monthly loan payment? b) What is the total amount of interest paid?

5. Blake needs \$35 000 in 5 years to start his own business. If he makes equal semi-annual deposits into an account that earns 7.5% interest compounded semi-annually, what semi-annual payment must he make?

